4.3.14. Holding Time Multipliers, Residential/Business

Definition: The potential modification to the average call "holding time" (i.e., duration) to reflect Internet use or other causes, expressed as a multiplier of the holding time associated with ordinary residential or business telephone calls.

Default Values:

Holding time multipliers	
Residential	Business
1.0	1.0

Support: The purpose of this parameter is to allow users to study the impact of increasing the offered load on the network. The default value of 1 means the load is that estimated from DEMs.

4.3.15. Call Attempts, Busy Hour (BHCA), Residential/Business

Definition: The number of call attempts originated per residential and business subscriber during the busy hour.

Default Values:

Busy Hour Call Attempts	
Residential	Business
1.3	3.5

Support: Bell Communications Research, *LATA Switching Systems Generic Requirements*, Section 17: Traffic Capacity and Environment, TR-TSY-000517, Issue 3, March 1989. This number is a composite of the results shown in table 17.6 C-G.

4.4. INTEROFFICE INVESTMENT

4.4.1. Transmission Terminal Investment

Definition: The investment in 1) the fully-equipped add-drop multiplexer (ADM) that extracts/inserts signals into OC-48 or OC-3 fiber rings, and are needed in each wire center to connect the wire center to the interoffice fiber ring; and 2) the fully-equipped OC-3/DS-1 terminal multiplexers required to interface to the OC-48 ADM and to provide point to point circuits between on-ring wire centers and end offices not connected directly to a fiber ring. The "Investment per 7 DS-1" figure is the amount by which the investment in OC-3s is reduced for each unit of 7 DS-1s below full capacity of the OC-3. See the figure in Appendix A.

Default Values:

Transmission Terminal Investment			
OC-48 ADM, Installed		OC-3/DS-1 ADM/Terminal Multiplexer, Installed	Investment per 7 DS-1s
48 DS-3s	12 DS-3s	84 DS-1s	7 DS-1s
$50,000	$40,000	$26,000	$500

Support: Industry experience and expertise of HAI, supplemented by consultations with telecommunications equipment suppliers.

4.4.2. Number of Fibers

Definition: The assumed fiber cross-section, or number of fibers in a cable, in an interoffice fiber ring and point to point connection.

Default Value:

Number of Fibers
24

Support: The default value is consistent with common practices within the telecommunications industry and reflects the engineering judgment of HAI Model developers.

4.4.3. Pigtail Investment

Definition: The cost of the short fiber connectors that attach the interoffice ring fibers to the wire center transmission equipment via a patch panel.

Default Value:

Pigtail Investment
$60 each

Support: A public source estimates the cost of pigtails at $75.00 per fiber. See, Reed, David P., *Residential Fiber Optic Networks and Engineering and Economic Analysis*, Artech House, Inc., 1992, p.93. The lower amount reflects an HAI estimate of price trends since that figure was published.

4.4.4 Optical Distribution Panel

Definition: The cost of the physical fiber patch panel used to connect 24 fibers to the transmission equipment.

Default Value:

Optical Distribution Panel
$1,000

Support: The cost for an installed fiber optic patch panel, including splicing of the fibers to pigtails, was estimated by a team of experienced outside plant experts who have contracted for such installations. A fiber optic patch panel contains no electronic or moving parts, but allows for the physical cross connection of fiber pigtails.

4.4.5. EF&I, per Hour

Definition: The per-hour cost for the "engineered, furnished, and installed" activities for equipment in each wire center associated with the interoffice fiber ring, such as the "pigtails" and patch panels to which the transmission equipment is connected.

Default Value:

EF&I
$55 per hour

Support: This is a fully loaded labor rate used for the most sophisticated technicians. It includes basic wages and benefits, Social Security, Relief & Pensions, management supervision, overtime, exempt material and motor vehicle loadings. A team of experienced outside plant experts estimated this value.

4.4.6. EF&I, Units

Definition: The number of hours required to install the equipment associated with the interoffice transmission system (see EF&I, per hour, above) in a wire center.

Default Value:

EFaI, units
32 hours

Support: This amount of labor was estimated by a team of experienced engineering experts. It includes the labor hours to install and test the transport equipment involved in interoffice facilities.

4.4.7. Regenerator Investment, Installed

Definition: The installed cost of an OC-48 optical regenerator.

Default Value:

Regenerator Investment, Installed
$15,000

Support: This approximation was obtained from a representative of a major fiber optic multiplexer manufacturer at Supercom '96, in June 1996 in Dallas, Texas.

4.4.8. Regenerator Spacing, Miles

Definition: The distance between digital signal regenerators in the interoffice fiber optics transmission system.

Default Value:

Regenerator Spacing
40 miles

Support: Based on field experience of maximum distance before fiber regeneration is necessary. This number is conservatively low compared to Fujitsu product literature, which indicates a maximum regenerator spacing of 110km, or approximately 69 miles[30] (with post- and pre-amp).

4.4.9. Channel Bank Investment, per 24 Lines

Definition: The investment in voice grade to DS-1 multiplexers in wire centers required for some special access circuits.

Default Value:

Channel Bank Investment, per 24 lines
$5,000

[30] Futjitsu Network Communications, Inc. product sheet for Flash™-192 multiplexer, *"Typical Optical Span Lengths SMF Fiber {Single Mode Fiber} 110 km (with post- and pre-amp)."*

Support: Industry experience and expertise of HAI, supplemented by consultations with telecommunications equipment suppliers.

4.4.10. Fraction of SA Lines Requiring Multiplexing

Definition: The percentage of special access circuits that require voice grade to DS-1 multiplexing in the wire center in order to be carried on the interoffice transmission system. This parameter is for use in conjunction with a study of the cost of special access circuits.

Default Value:

Fraction of SA Lines Requiring Multiplexing
0.0

Support: The default value of zero is appropriate for the existing set of UNEs, which do not include a special access UNE.

4.4.11. Digital Cross Connect System, Installed, per DS-3

Definition: The investment required for a digital cross connect system that interfaces DS-1 signals between switches and OC-3 multiplexers, expressed on a per DS-3 (672 DS-0) basis.

Default Value:

Digital Cross Connect System, Installed, per DS-3
$30,000

Support: Industry experience and expertise of HAI, supplemented by consultations with telecommunications equipment suppliers.

4.4.12. Transmission Terminal Fill (DS-0 level)

Definition: The fraction of maximum DS-0 circuit capacity that can actually be utilized in ADMs, DS-1 to OC-3 multiplexers, and channel banks.

Default Value:

Transmission Terminal Fill (DS-0 level)
0.90

Support: Based on outside plant subject matter expert judgment.

4.4.13. Interoffice Fiber Cable Investment per Foot, Installed

Definition: The installed cost per foot of interoffice fiber cable, assuming a 24-fiber cable.

Default Value:

Interoffice Fiber Cable Investment, Installed, per foot
$3.50

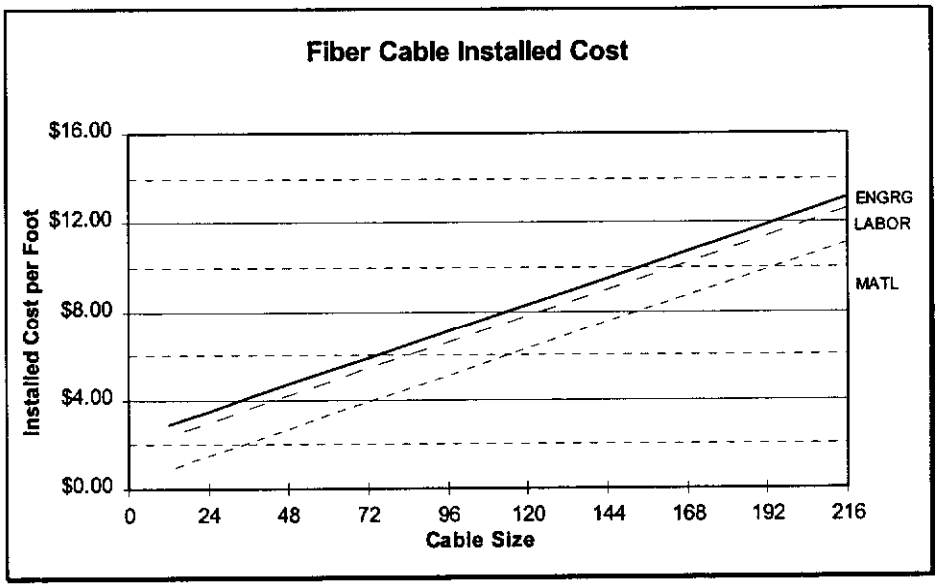
Support: ***{NOTE: The discussion in Section 3.4.2. [Fiber Feeder] is reproduced here for ease of use.}***

Outside plant planning engineers commonly assume that the cost of cable material can be represented as an a + bx straight line graph. In fact, Bellcore Planning tools, EFRAP I, EFRAP II, and LEIS:PLAN have the engineer develop such an a + bx equation to represent the cost of cable. As technology, manufacturing methods, and competition have advanced, the price of cable has been reduced. While in the past, the cost of fiber cable was typically ($.50 + $.10 per fiber) per foot, current costs are typically ($.30 + $.05 per fiber) per foot.

Splicing Engineering and Direct Labor are included in the cost of the Remote Terminal Installations, and the Central Office Installations, since field splicing is unnecessary with fiber cable pulls as long as 35,000 feet between splices.

Placing Engineering and Direct Labor are estimated at $2.00 per foot, consisting of $0.50 in engineering per foot, plus $1.50 direct labor per foot. These estimates were provided by a team of Outside Plant Engineering and Construction experts.

The following chart represents the default values used in the model.



4.4.14. Number of Strands per ADM

Definition: The number of interoffice fiber strands connected to the ADM in each wire center. At least four strands per ADM are required around the ring.

Default Value:

Number of Strands per ADM
4

Support: This is the standard number of strands required by an ADM. It provides for redundant transmission in both directions around the interoffice fiber ring.

4.4.15. Interoffice Structure Percentages

Definition: The relative amounts of different structure types supporting interoffice transmission facilities. Aerial cable is attached to telephone poles or buildings, buried cable is laid directly in the earth, and underground cable runs through underground conduit. Aerial and buried percentages are entered by the user; the underground fraction is then computed.

Default Values:

Structure Percentages		
Aerial	Buried	Underground
20%	60%	*20%*

Support: These are average figures that reflect the judgment of a team of outside plant experts regarding the appropriate mix of density zones applicable to interoffice transmission facilities.

4.4.16. Transport Placement

Definition: The cost of fiber cable structures used in the interoffice transmission system.

Default Values:

Transport Placement, per foot	
Buried	Conduit
$1.77	$16.40

Support: Structures closer to the central office are normally shared with feeder cable. Additional structures at the end of feeder routes may be required to complete an interoffice transport path. Since distances farther from the central office normally involve lower density zones, average structure costs appropriate for lower density zones are reflected in the default values. A default value for Buried representing the lower density zones is used, while a conservatively higher value is used for Conduit, representing the default value expected in a 850-2,550 line per square mile density zone.

4.4.17. Buried Sheath Addition

Definition: The cost of dual sheathing for additional mechanical protection of fiber interoffice transport cable.

Default Value:

Buried Sheath Addition
$0.20 per feet

Support: ***{NOTE: The discussion in Section 3.2.3. [Fiber Feeder] is reproduced here for ease of use.}***

Incremental cost for mechanical sheath protection on fiber optic cable is a constant per foot, rather than the ratio factor used for copper cable, because fiber sheath is approximately ½ inch in diameter, regardless of the number of fiber strands contained in the sheath. The incremental per foot cost was estimated by a team of experienced outside plant experts who have purchased millions of feet of fiber optic cable.

4.4.18. Interoffice Conduit, Cost and Number of Tubes

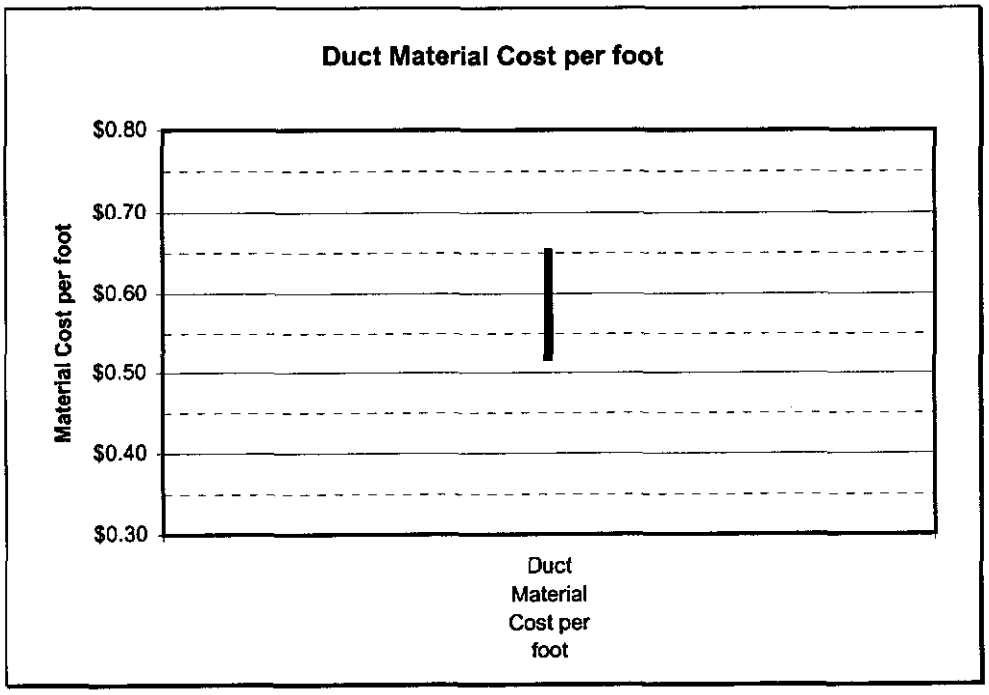
Definition: The cost per foot for interoffice fiber cable conduit, and the number of spare tubes (conduit) placed per route.

Default Values:

Interoffice Conduit, Cost and Number of Tubes	
Cost	Spare Tubes per Route
$0.60 per feet	1

Support: ***{NOTE: The discussions in Sections 2.4.3. and 2.4.4. [Distribution] are reproduced here for ease of use.}***

Conduit Cost per foot:
Several suppliers were contacted for material prices. Results are shown below.



The labor to place conduit in trenches is included in the cost of the trench, not in the conduit cost.

Under the Model's assumptions, a relatively few copper cables serving short distances (e.g., less than 9,000 ft. feeder cable length), and one or more fiber cables to serve longer distances, will be needed. Since the number of cables in each of the four feeder routes is relatively small, the predominant cost is that of the trench, plus the material cost of a few additional 4" PVC conduit pipes. No additional allowance is necessary for stabilizing the conduit in the trench.

Spare Tubes per Route:
"A major advantage of using conduits is the ability to reuse cable spaces without costly excavation by removing smaller, older cables and replacing them with larger cables or fiber facilities. Some companies reserve vacant ducts for maintenance purposes."[31] Version 5.0a of the HAI Model provides one spare maintenance duct (as default) in each conduit run. In addition, if there is also a fiber feeder cable along with a copper feeder cable in the run, an additional maintenance duct (as a default) is provided in each conduit run to facilitate a fiber cable replacement at the same time a copper cable replacement may be required.

4.4.19. Pullbox Spacing

Definition: Spacing between pullboxes in the interoffice portion of the network.

Default Value:

Pullbox Spacing
2,000 feet

Support: ***{NOTE: The discussion in Section 3.2.2. [Feeder] is reproduced here for ease of use.}***

Unlike copper manhole spacing, the spacing for fiber pullboxes is based on the practice of coiling spare fiber (slack) within pullboxes to facilitate repair in the event the cable is cut or otherwise impacted. Fiber feeder pullbox spacing is not a function of the cable reel lengths, but rather a function of length of cable placed. The standard practice during the cable placement process is to provide for 5 percent excess cable to facilitate subsurface relocation, lessen potential damage from impact on cable, or provide for ease of cable splicing when cable is cut or damaged.[32] It is common practice for outside plant engineers to require approximately 2 slack boxes per mile.

4.4.20. Pullbox Investment

Definition: Investment per fiber pullbox in the interoffice portion of the network.

Default Value:

Pullbox Investment
$500

Support: ***{NOTE: The discussion in Section 3.7. [Fiber Feeder] is reproduced here for ease of use.}***

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[31] Bellcore, *BOC Notes on the LEC Networks - 1994*, p. 12-42.

[32] CommScope, *Cable Construction Manual, 4th Edition*, p. 75.

The information was received verbally from a Vice President of PenCell Corporation at their Supercom '96 booth. He stated a price of approximately $280 for one of their larger boxes, without a large corporate purchase discount. Including installation, HM 5.0a uses a default value of $500.

4.4.21. Pole Spacing, Interoffice

Definition: Spacing between poles supporting aerial interoffice fiber cable.

Default Value:

Pole Spacing, Interoffice
150 feet

Support: This is a representative figure accounting for the mix of density zones applicable to interoffice transmission facilities.

4.4.22. Interoffice Pole Material and Labor

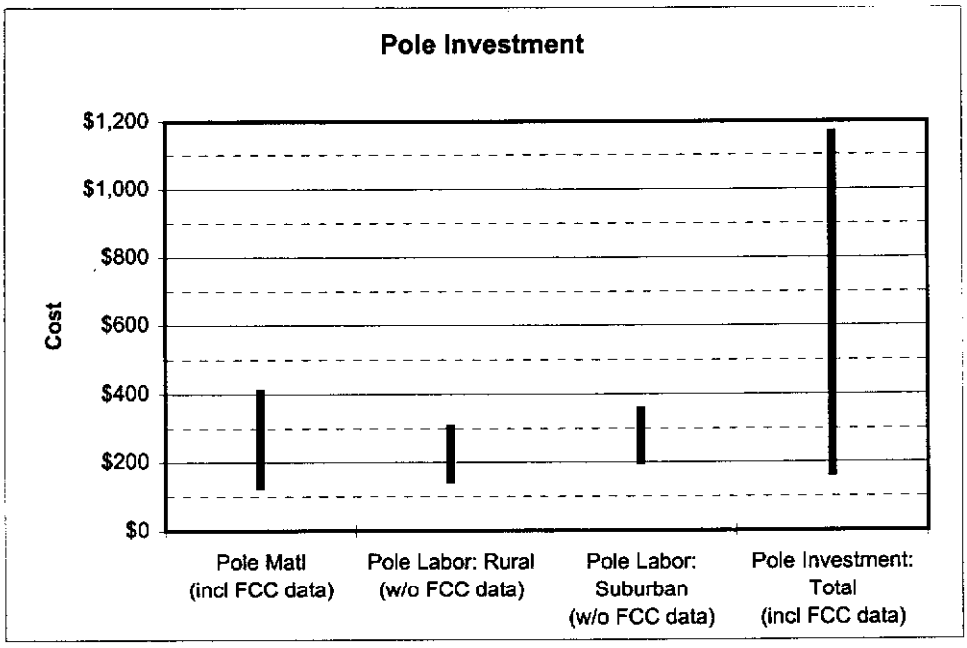
Definition: The installed cost of a 40' Class 4 treated southern pine pole.

Default Values:

Pole Investment	
Materials	$201
Labor	$216
Total	*$417*

Support: ***{NOTE: The discussion in Section 2.4.1. [Distribution] is reproduced here for ease of use. Refer to Section 2.4.1. [Distribution] for material, labor and total pole investment as depicted in a compilation of pole data charts that has recently been filed by large telephone companies with the FCC.}***

Pole investment is a function of the material and labor costs of placing a pole. Costs include periodic down-guys and anchors. Utility poles can be purchased and installed by employees of ILECs, but are frequently placed by contractors. Several sources revealed the following information on prices.



The exempt material load on direct labor includes ancillary material not considered by FCC Part 32 as a unit of plant. That includes items such as downguys and anchors that are already included in the pole placement labor cost. The steel strand run between poles is likewise an exempt material item, charged to the aerial cable account. The cost of steel strands is not included in the cost of poles; it is included in the installed cost of aerial cable.

4.4.23. Fraction of Interoffice Structure Common with Feeder

Definition: The percentage of structure supporting interoffice transport facilities that is also shared by feeder facilities, expressed as a fraction of the smaller of the interoffice and feeder investment for each of the three types of facilities (i.e., aerial, buried and underground are treated separately in calculating the amount of sharing).

Default Value:

Fraction of Interoffice Structure Common with Feeder
.75

Support: Interoffice transport facilities will almost always follow feeder routes which radiate from each central office. Typically only a small distance between adjacent wire centers is not traversed by a feeder route; for this distance, structure is appropriately assigned exclusively to interoffice transport. In the opinion of a team of outside plant engineers, the additional structure required exclusively for interoffice transport is no more than 25 percent of the distance. Therefore, 75 percent of the interoffice route is assumed by the HM 5.0a to be shared with feeder cables.

4.4.24. Interoffice Structure Sharing Fraction

Definition: The fraction of investment in interoffice poles and trenching that is assigned to LECs. The remainder is attributed to other utilities/carriers.

Default Values:

Fraction of Interoffice Structure Assigned to Telephone		
Aerial	Buried	Underground
.33	.33	.33

Support: The structure sharing with other utilities covered by this parameter involves the portion of interoffice structure that is not shared with feeder cable. Sharing with other utilities is assumed to include at least two other occupants of the structure. Candidates for sharing include electrical power, CATV, competitive long distance carriers, competitive local access providers, municipal services and others. See also Appendix B.

4.5. TRANSMISSION PARAMETERS

4.5.1. Operator Traffic Fraction

Definition: Fraction of traffic that requires operator assistance. This assistance can be automated or manual (see Operator Intervention Fraction in the Operator Systems section below)

Default Value:

Operator Traffic Fraction
0.02

Support: Industry experience and expertise of HAI.

4.5.2. Total Interoffice Traffic Fraction

Definition: The fraction of all calls that are completed on a switch other than the originating switch, as opposed to calls completed within a single switch.

Default Value:

Total Interoffice Traffic Fraction
0.65

Support: According to *Engineering and Operations in the Bell System*, Table 4-5, p. 125, the most recent information source found to date, the percentage of calls that are interoffice calls ranges from 34 percent for rural areas to 69 percent for urban areas. Assuming weightings according to the typical number of lines per wire center for each environment (urban, suburban, rural), these figures suggest an overall interoffice traffic fraction of approximately 65 percent.

4.5.3. Maximum Trunk Occupancy, CCS

Definition: The maximum utilization of a trunk during the busy hour.

Default Value:

Maximum Trunk Occupancy, CCS
27.5

Support: AT&T Capacity Cost Study.[33]

4.5.4. Trunk Port Investment, per End

Definition: Per-trunk equivalent investment in switch trunk port at each end of a trunk.

[33] Blake, et al., *"A Study of AT&T's Competitors' Capacity to Absorb Rapid Demand Growth"*, p.4.

Default Value:

Trunk Investment, per end
$100

Support: AT&T Capacity Cost Study.[34] HAI judgment is that $100 is for the switch port itself.

4.5.5. Direct-Routed Fraction of Local Interoffice Traffic

Definition: The amount of local interoffice traffic that is directly routed between originating and terminating end offices as opposed to being routed via a tandem switch.

Default Value:

Direct-Routed Fraction of Local Interoffice
0.98

Support: The direct routed fraction of local interoffice is based on data filed by the LECs in response to an FCC data request issued in Docket 80-286: *In the Matter of Amendment of Part 36 of the Commission's Rules and Establishment of a Joint Board*, Docket 80-286, Order, December 1, 1994, 9 FCC Rcd 7962 (1994). See Universal Service Fund Data Request, File 1 of 4, page 8 of 11, 9 FCC Rcd 7962, 7976.

4.5.6. Tandem-Routed Fraction of Total IntraLATA Toll Traffic

Definition: Fraction of intraLATA toll calls that are routed through a tandem.

Default Value:

Tandem-Routed Fraction of Total IntraLATA Toll Traffic
0.2

Support: The tandem routed fraction of total intraLATA toll traffic is based on data filed by the LECs in response to an FCC data request issued in Docket 80-286: *In the Matter of Amendment of Part 36 of the Commission's Rules and Establishment of a Joint Board*, Docket 80-286, Order, December 1, 1994, 9 FCC Rcd 7962 (1994). See Universal Service Fund Data Request, File 1 of 4, page 8 of 11, 9 FCC Rcd 7962, 7976.

4.5.7. Tandem-Routed Fraction of Total InterLATA Traffic

Definition: Fraction of interLATA (IXC access) calls that are routed through a tandem instead of directly to the IXC.

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[34] Blake, et al., *"A Study of AT&T's Competitors' Capacity to Absorb Rapid Demand Growth,"*, p. 7.

Default Value:

Tandem-Routed Fraction of Total InterLATA Traffic
0.2

Support: The tandem routed fraction of total interLATA traffic is based on data filed by the LECs in response to an FCC data request issued in Docket 80-286: *In the Matter of Amendment of Part 36 of the Commission's Rules and Establishment of a Joint Board*, Docket 80-286, Order, December 1, 1994, 9 FCC Rcd 7962 (1994). See Universal Service Fund Data Request, File 1 of 4, page 8 of 11, 9 FCC Rcd 7962, 7976.

4.5.8. POPs per Tandem Location

Definition: The number of IXC points of presence requiring an entrance facility, per LEC tandem.

Default Value:

POPs per Tandem Location
5

Support: An assumption that envisions POPs for three principal IXCs plus two smaller carriers associated with each LEC tandem.

4.5.9. Threshold Value for Off-Ring Wire Centers

Definition: The threshold value, in lines, that determines whether a wire center should be included in ring calculations and therefore be a candidate to appear on (that is, be directly connected to) a ring. Wire centers whose size falls below the threshold will not be appear on a ring, but will be connected via a point-point link to the tandem switch or via a "spur" to the nearest wire center that is on a ring. Transmission equipment in such cases consists of terminal multiplexers and not ADMs. This parameter only applies to companies that own and operate a local tandem switch.

Default Value:

Threshold Value for Off-Ring Wire Centers, total lines
1

Support: The algorithm that calculates ring configurations includes a test to ensure it is economic to incur the cost of terminal equipment required to be on the ring. Therefore, no other arbitrary limitation is required.

4.5.10. Remote-Host Fraction of Interoffice Traffic

Definition: Fraction of local direct traffic assumed to flow from a remote to its host switch.

Default Value:

Remote – Host Fraction of Interoffice Traffic, Remote
0.10

Support: Based on HAI judgment.

4.5.11. Host-Remote Fraction of Interoffice Traffic

Definition: Fraction of local direct traffic assumed to flow from a host to its remotes.

Default Value:

Host – Remote Fraction of Interoffice Traffic, Host
0.05

Support: Based on HAI judgment.

4.5.12. Maximum Nodes per Ring

Definition: Maximum number of ADMs that are permitted on a single ring.

Default Value:

Maximum Nodes per Ring
16

Support: Buffering and other internal delays in add/drop multiplexers (ADMs) ultimately limit the number of ADMs that can constitute a SONET ring. A 16-node limit is a typical value.[35]

4.5.13. Ring Transiting Traffic Factor

Definition: An estimated factor, representing the fraction of traffic that flows from one ring to another by way of a third, or "transit," ring.

Default Value:

[35] Fujitsu, *Network Design Features, FJTU-320-560-100, Issue 3, Revision 1*, December 1995, p.11.

Ring Transiting Traffic Factor
0.40

Support: Based on HAI judgement of the amount of traffic between wire centers on different rings versus total interoffice traffic and the number of rings that must be transited between the originating and terminating wire center.

4.5.14. Intertandem Fraction of Tandem Trunks

Definition: A factor used to estimate the number of additional tandem trunks required to carry intertandem traffic.

Default Value:

Intertandem Fraction of Tandem trunks
0.10

Support: Based on HAI judgement.

4.6. TANDEM SWITCHING

4.6.1. Real Time Limit, BHCA

Definition: The maximum number of BHCA a tandem switch can process.

Default Value:

Real Time Limit, BHCA
750,000

Support: Industry experience and expertise of HAI. These numbers are well within the range of the BHCA limitations NORTEL supplies in its Web site. See 4.1.1.

4.6.2. Port Limit, Trunks

Definition: The maximum number of trunks that can be terminated on a tandem switch.

Default Value:

Port Limit, Trunks
100,000

Support: AT&T Updated Capacity Cost Study.[36]

4.6.3. Tandem Common Equipment Investment

Definition: The amount of investment in common equipment for a large tandem switch. Common Equipment is the hardware and software that is present in the tandem in addition to the trunk terminations themselves. The cost of a tandem is estimated by the HM as the cost of common equipment plus an investment per trunk terminated on the tandem.

Default Value:

Tandem Common Equipment Investment
$1,000,000

Support: AT&T Capacity Cost Study.[37]

4.6.4. Maximum Trunk Fill (Port Occupancy)

Definition: The fraction of the maximum number of trunk ports on a tandem switch that can be utilized.

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[36] Brand, T.L., Hallas, G.A., et al., *"An Updated Study of AT&T's Competitors' Capacity to Absorb Rapid Demand Growth"*, April 19, 1995, p. 9.

[37] Blake, et. al., *"A Study of AT&T's Competitors' Capacity to Absorb Rapid Demand Growth"*, p.9.

Default Value:

Maximum Trunk Fill (port occupancy)
0.90

Support: This is a HAI estimate, which is used in lieu of forward looking alternatives from public sources or ILECs. It is based on consultations with AT&T and MCI subject matter experts.

4.6.5. Maximum Tandem Real Time Occupancy

Definition: The fraction of the total capacity (expresses as the real time limit, BHCA) a tandem switch is allowed to carry before an additional switch is provided.

Default Value:

Maximum Tandem Real Time Occupancy
0.9

Support: Bell Communications Research, *LATA Switching Systems Generic Requirements*, Section 17: Traffic Capacity and Environment, TR-TSY-000517, Issue 3, March 1989, figure 17.5-1, p. 17-24.

4.6.6. Tandem Common Equipment Intercept Factor

Definition: The multiplier of the common equipment investment input that gives the common equipment cost for the smallest tandem switch, allowing scaling of tandem switching investment according to trunk requirements.

Default Value:

Tandem Common Equipment Intercept Factor
0.50

Support: Value selected to allow tandem common equipment investment to range from $500,000 to $1,000,000 which is the appropriate range based on expertise of HAI.

4.6.7. Entrance Facility Distance from Serving Wire Center & IXC POP

Definition: Average length of trunks connecting an IXC POP with the wire center that serves it.

Default Value:

Entrance Facility Distance from Serving Wire Center & IXC POP
0.5 miles

Support: Value selected in recognition of the fact that IXCs typically locate POPs close to the serving wire center to avoid long cable runs.

4.7. SIGNALING

4.7.1. STP Link Capacity

Definition: The maximum number of signaling links that can be terminated on a given STP pair.

Default Value:

STP Link Capacity
720

Support: AT&T Updated Capacity Cost Study.[38]

4.7.2. STP Maximum Fill

Definition: The fraction of maximum links (as stated by the STP link capacity input) that the model assumes can be utilized before it adds another STP pair.

Default Value:

STP Maximum Fill
0.80

Support: The STP maximum fill factor is based on HAI engineering judgment and is consistent with maximum link/port fill levels throughout HM 5.0a.

4.7.3. STP Maximum Common Equipment Investment, per Pair

Definition: The cost to purchase and install a pair of maximum-sized STPs.

Default Value:

STP Maximum Common Equipment Investment, per pair
$5,000,000

Support: AT&T Updated Capacity Cost Study.[39]

4.7.4. STP Minimum Common Equipment Investment, per Pair

Definition: The minimum investment for a minimum-capacity STP, i.e.: the fixed investment for an STP pair that serves a minimum number of links.

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[38] Brand, et al., *"An Updated Study of AT&T's Competitors' Capacity to Absorb Rapid Demand Growth"*, p. 26.

[39] Brand, et al., *"An Updated Study of AT&T's Competitors' Capacity to Absorb Rapid Demand Growth"*,p. 26.

Default Value:

STP Minimum Common Equipment Investment, per pair
$1,000,000

Support: It is necessary to allow the scaling of STP common equipment for smaller STPs that in some configuration are sufficient for local exchange carriers. The minimum STP common equipment investment cost is an HAI judgment of the lower end of the range of common equipment investment.

4.7.5. Link Termination, Both Ends

Definition: The investment required for the transmission equipment that terminates both ends of an SS7 signaling link.

Default Value:

Link Termination, Both Ends
$900

Support: AT&T Updated Capacity Cost Study.[40]

4.7.6. Signaling Link Bit Rate

Definition: The rate at which bits are transmitted over an SS7 signaling link.

Default Value:

Signaling Link Bit Rate
56,000 bits per second

Support: The AT&T Updated Capacity Cost Study, and an SS7 network industry standard.[41]

4.7.7. Link Occupancy

Definition: The fraction of the maximum bit rate that can be sustained on an SS7 signaling link.

[40] Brand, et al., *"An Updated Study of AT&T's Competitors' Capacity to Absorb Rapid Demand Growth"*, p. 26.

[41] Brand, et al., *"An Updated Study of AT&T's Competitors' Capacity to Absorb Rapid Demand Growth"*, p. 25.

Default Value:

Link Occupancy
0.40

Support: AT&T Updated Capacity Cost Study.[42]

4.7.8. C Link Cross-Section

Definition: The number of C-links in each segment connecting a mated STP pair.

Default Value:

C Link Cross-Section
24

Support: The input was derived assuming the 56 kbps signaling links between STPs are normally transported in a DS-1 signal, whose capacity is 24 DS-0s.

4.7.9. ISUP Messages per Interoffice BHCA

Definition: The number of Integrated Services Digital Network User Part (ISUP) messages associated with each interoffice telephone call attempt. Switches send to each other ISUP messages over the SS7 network to negotiate the establishment of a telephone connection.

Default Value:

ISUP messages per Interoffice BHCA
6

Support: AT&T Updated Capacity Cost Study.[43]

4.7.10. ISUP Message Length, Bytes

Definition: The average number of bytes in each ISUP (ISDN User Part) message.

Default Value:

ISUP Message Length
25 bytes

[42] Brand, et al., *"An Updated Study of AT&T's Competitors' Capacity to Absorb Rapid Demand Growth"*, p. 24.

[43] Brand, at al., *"An Updated Study of AT&T's Competitors' Capacity to Absorb Rapid Demand Growth"*, p. 25.

Support: Bellcore Technical Reference TR-NWT-000317, Appendix A, shows that 25 bytes per message is a conservatively high figure. Northern Telecom's DMS-STP product/service information booklet shows an average ISUP message length of 25 bytes.[44] Therefore a default value of 25 average bytes per message is appropriate for use in the HAI Model.

4.7.11. TCAP Messages per Transaction

Definition: The number of Transaction Capabilities Application Part (TCAP) messages required per Service Control Point (SCP) database query. A TCAP message is a message between a switch and a database that is necessary to provide the switch with additional information prior to setting up a call or completing a call.

Default Value:

TCAP Messages per Transaction
2

Support: AT&T Updated Capacity Cost Study.[45]

4.7.12. TCAP Message Length, Bytes

Definition: The average length of a TCAP message.

Default Value:

TCAP Message Length
100 bytes

Support: Bellcore Technical Reference TR-NWT-000317, Appendix A, shows that 100 bytes per message is a conservatively high figure. Northern Telecom's DMS-STP product/service information booklet shows an average TCAP message length of 85 bytes.[46]

4.7.13. Fraction of BHCA Requiring TCAP

Definition: The percentage of BHCAs that require a database query, and thus generate TCAP messages.

Default Value:

Fraction of BHCA Requiring TCAP
0.10

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[44] Northern Telecom, *DMS-STP Planner 1995, Product/Service Information, 57005.16, Issue 1*, April, 1995, p.13.

[45] Brand, et al., *"An Updated Study of AT&T's Competitors' Capacity to Absorb Rapid Demand Growth"*, p. 25.

[46] DMS-STP Planner 1995, p.13.

Support: The AT&T Updated Capacity Cost Study assumes that 50% of all calls require a database query, but that is not an appropriate number to use in the HM because a substantial fraction of IXC calls are toll-free (800) calls.[47] When reduced to reflect the fact that a large majority of calls handled by the LECs are local calls that do not require such a database query, the 50% would be less than 10%; HAI has used the 10% default as a conservatively high estimate.

4.7.14. SCP Investment per Transaction per Second

Definition: The investment in the SCP associated with database queries, or transactions, stated as the investment required per transaction per second. For example, if the default of $20,000 is assumed, an SCP required to handle 100 transactions per second would require a 2 million dollar ($20,000 times 100) investment.

Default Value:

SCP Investment per Transaction, per Second
$20,000

Support: AT&T Updated Capacity Cost Study uses a default value of $30,000 from the 1990 study, but notes that this is "conservatively high because of the industry's advances in this area and the resulting decrease in technology costs since the 1990 study."[48] The default value used in the HM represents the judgment of HAI as to the reduction of such processing costs since then.

[47] Brand, et al., *"An Updated Study of AT&T's Competitors' Capacity to Absorb Rapid Demand Growth"*, p. 25.

[48] Brand, et al., *"An Updated Study of AT&T's Competitors' Capacity to Absorb Rapid Demand Growth"*, p. 27.

4.8. OS AND PUBLIC TELEPHONE

4.8.1. Investment per Operator Position

Definition: The investment per computer required for each operator position.

Default Value:

Investment per Operator Position
$6,400

Support: Based on AT&T experience in the long distance business.

4.8.2. Maximum Utilization per Position, CCS

Definition: The estimated maximum number of CCS that one operator position can handle during the busy hour.

Default Value:

Maximum Utilization per Position
32 CCS

Support: Industry experience and expertise of HAI in conjunction with subject matter experts.

4.8.3. Operator Intervention Factor

Definition: The percentage of all operator-assisted calls that require operator intervention, expressed as 1 out of every N calls, where N is the value of the input. Given the default values for operator-assisted calls, this parameter means that 1/10, or 10%, of the assisted calls actually require manual intervention of an operator, as opposed to *automated* operator assistance for credit card verification, etc.

Default Value:

Operator Intervention Factor
10

Support: Industry experience and expertise of HAI.

4.8.4. Public Telephone Equipment Investment per Station

Definition: The weighted average cost of a public telephone and pedestal (coin/non-coin and indoor/outdoor).

Default Value:

Public Telephone Equipment Investment, per Station
$760

Support: New England Incremental Cost Study.[49]

[49] New England Telephone Company, *"1993 New Hampshire Incremental Cost Study"*, p. 90.

4.9. ICO PARAMETERS

4.9.1. ICO STP Investment, per Line

Definition: The surrogate value for equivalent per line investment in STPs by a small independent telephone company (ICO), that is used in lieu of calculating it directly in the model.

Default Value:

ICO STP Investment per Line
$5.50

Support: The average STP investment per line estimated by the HAI Model for all states, with 20 percent added to reflect the higher cost a small ICO is likely to encounter, due to its character of use.

4.9.2. ICO Local Tandem Investment, per Line

Definition: The surrogate value for the per line investment in a local tandem switch by a small independent telephone company (ICO), that is used in lieu of calculating it directly in the model.

Default Value:

Per Line ICO Local Tandem Investment
$1.90

Support: The average local tandem investment per line from the HAI Model, with 20 percent added to reflect the higher cost a small ICO is likely to encounter, due to its character of use.

4.9.3. ICO OS Tandem Investment, per Line

Definition: The surrogate value for the per line investment in an Operator Services tandem switch by a small independent telephone company (ICO),that is used in lieu of calculating it directly in the model.

Default Value:

Per Line ICO OS Tandem Investment
$0.80

Support: The average OS tandem investment per line from the HAI Model, with 20 percent added to reflect the higher cost a small ICO is likely to encounter, due to its character of use.

4.9.4. ICO SCP Investment, per Line

Definition: The surrogate value for the per line investment in a SCP by a small independent telephone company (ICO), that is used in lieu of calculating it directly in the model.

Default Value:

Per Line ICO SCP Investment
$2.50

Support: The average SCP investment per line from the HAI Model, with 20 percent added to reflect the higher cost a small ICO is likely to encounter, due to its character of use.

4.9.5. ICO STP/SCP Wire Center Investment, per Line

Definition: The surrogate value for the per line investment in an STP/SCP wire center by a small independent telephone company (ICO), that is used in lieu of calculating it directly in the model.

Default Value:

Per Line STP / SCP Wire Center Investment
$0.40

Support: The average STP/SCP wire center investment per line from the HAI Model, with 20 percent added to reflect the higher cost a small ICO is likely to encounter, due to its character of use.

4.9.6. ICO Local Tandem Wire Center Investment, per Line

Definition: The surrogate value for the per line investment in a local tandem wire center by a small independent telephone company (ICO), that is used in lieu of calculating it directly in the model.

Default Value:

Per Line ICO Local Tandem Wire Center Investment
$2.50

Support: The average local tandem wire center investment per line from the HAI Model, with 20 percent added to reflect the higher cost a small ICO is likely to encounter, due to its character of use.

4.9.7. ICO OS Tandem Wire Center Investment, per Line

Definition: The surrogate value for the per line investment in a operator services tandem wire center by a small independent telephone company (ICO), that is used in lieu of calculating it directly in the model.

Default Value:

Per Line ICO OS Tandem Wire Center Investment
$1.00

Support: The average OS tandem wire center investment per line from the HAI Model, with 20 percent added to reflect the higher cost a small ICO is likely to encounter, due to its character of use.

4.9.8. ICO C-Link / Tandem A-Link Investment, per Line

Definition: The surrogate value for the per line investment in a C-link / tandem A-link by a small independent telephone company (ICO), that is used in lieu of calculating it directly in the model.

Default Value:

Per Line ICO C-Link / Tandem A-Link Investment
$0.30

Support: The average C-Link / tandem A-link investment per line from the HAI Model, with 20 percent added to reflect the higher cost a small ICO is likely to encounter, due to its character of use.

4.9.9. Equivalent Facility Investment per DS0

Definition: The per-DS0 surrogate facilities investment by a small ICO for dedicated circuits between an end office and tandem switch belonging to the BOC (or other large LEC) on which the ICO relies for interoffice connectivity.

Default Value:

Equivalent Facility Investment per DS0
$138.08

Support: The model computes the explicit investment required for facilities and terminal equipment connecting the ICO wire center with the nearest BOC wire center, then uses this parameter to separately compute a per-DS0 equivalent facilities investment in BOC dedicated circuits between the BOC wire center and the BOC tandem. The default value is the nationwide average BOC investment in the dedicated transport UNE (part of transport network elements) as calculated by the Model. Alternatively, the user can input the state-specific value that results from running the model for the BOC in question.

4.9.10. Equivalent Terminal Investment per DS0

Definition: The per-DS0 surrogate investment by a small ICO for terminal equipment used on dedicated circuits between an end office and tandem switch belonging to the BOC (or other large LEC) on which the ICO relies for interoffice connectivity.

Default Value:

Equivalent Terminal Investment per DS0
$111.62

Support: In addition to the equivalent facilities investment incurred by an ICO for the BOC end office to tandem dedicated circuits, the model uses this parameter to separately compute a per-DS0 equivalent

investment in the terminal equipment used on the dedicated circuits. The default value is the nationwide average BOC investment in the dedicated transmission terminal UNE (part of transport network elements) as calculated by the Model. Alternatively, the user can input the state-specific value that results from running the model for the BOC in question.

4.10. HOST – REMOTE ASSIGNMENT

4.10.1. Host – Remote CLLI Assignments

Definition: An input form consisting of parameters that allow the user to specify the set of host and remote wire centers, and establish the relationships between remotes and their serving host, using the CLLI codes of the respective switches. In the default mode, HM 5.0a does not make such designations or identify such relationships.

Default Value:

Host – Remote CLLI Assignments
No host-remote relationships defined

Support: These parameters are provided to give the user the means to establish host-remote relationships.

4.10.2. Host – Remote Assignment Enable

Definition: An option that, if enabled, instructs the model to perform switching calculations based on the host-remote relationships defined by Parameter 4.10.1. If enabled, 1) the investment in host/remote combinations are distributed equally among all lines served by the combination, 2) the cost of umbilical trunks between remotes and hosts is modeled explicitly, and 3) the host and remotes will be connected on a local SONET ring.

Default Value:

Host – Remote Assignment Flag
Disabled

4.11. HOST - REMOTE INVESTMENT

4.11.1. Line Sizes

Definition: The line size designations used to specify fixed and per line investments for stand alone, host and remote switches.

Default Values:

Line Size
0

640
5,000
10,000

Support: The HAI Model allows the user to specify the method of computing end office switching investments which, for host, remote, and standalone switches are specified by switch line size. The normal mode of operation in the Model aggregates switch investment as a function of switch line size. The user defined host/remote/standalone switch assignments will allow the user to define the switch investment with explicit identification of host/remote systems.

4.11.2. Fixed and per Line Investments

Definition: The fixed and per line investments included in the function that calculates the per line switching investment as a function of switch line size for host, remote, and stand alone switches, expressed separately for BOCs and large independents and for small independents. The cost function for each type of switch and each type of telephone company is assumed to have the form A + B * x, where A is the fixed investment, B is the per-line investment, and x is the number of lines.

Default Value:

Fixed and per Line Investments for Standalone, Host and Remote Switches						
BOCs and Large ICOs						
Line Size	Standalone fixed investment	Host fixed investment	Remote fixed investment	Standalone per line investment	Host per line investment	Remote per line investment
0	$175,000	$183,750	$10,000	$75	$75	$85
640	$175,000	$183,750	$55,000	$75	$75	$83
5,000	$175,000	$183,750	$70,000	$75	$75	$85
10,000	$475,000	$498,750	$225,000	$73	$73	$70
Small ICOs						
Line Size	Standalone fixed investment	Host fixed investment	Remote fixed investment	Standalone per line investment	Host per line investment	Remote per line investment
0	$300,001	$315,001	$17,143	$129	$129	$146
640	$300,001	$315,001	$94,286	$129	$129	$141
5,000	$300,001	$315,001	$120,000	$129	$129	$146
10,000	$814,289	$855,003	$385,716	$124	$124	$120

Support: The default values are assembled on a forward-looking basis and are derived on the basis of a forced amalgam of host, remote and standalone switch investments. This system of derived costs does not reflect a detailed analysis of prices. The default values are computed from an amalgamated process, whereby the three categories of switch investments are derived as a function of three representative curves, generated by separate line size, and when considered together yield the same result as the cost function for amalgamated switches.

5. EXPENSE

5.1. COST OF CAPITAL AND CAPITAL STRUCTURE

Definition: The capital cost structure, including the debt/equity ratio, cost of debt, and return on equity, that makes up the overall cost of capital.

Default Values:

Cost of Capital	
Debt percent Cost of debt Cost of equity	0.450 0.077 0.119
Weighted average Cost of capital	0.1001

Support: Based on FCC-approved cost of capital methodology using 1996 financial data and AT&T and MCI-sponsored DCF and CAPM analyses calculating the RBOCs' cost of capital. See, for example, "Statement of Matthew I. Kahal Concerning Cost of Capital," In the Matter of Rate of Return Prescription for Local Exchange Carriers," File No. AAD95-172, March 11, 1996. See also AT&T ex parte filing of February 12, 1997, "Estimating the Cost of Capital of Local Telephone Companies for the Provision of Network Elements," by Bradford Cornell, September, 1996.

5.2. DEPRECIATION AND NET SALVAGE

Definition: The economic life and net salvage value of various network plant categories.

Default Values:

Plant Type	Economic Life	Net Salvage %
motor vehicles	8.24	11.21
garage work equipment	12.22	-10.71
other work equipment	13.04	3.21
buildings	46.93	1.87
furniture	15.92	6.88
office support equipment	10.78	6.91
company comm. Equipment	7.40	3.76
general purpose computers	6.12	3.73
digital electronic switching	16.17	2.97
operator systems	9.41	-0.82
digital circuit equipment	10.24	-1.69
public telephone term. Equipment	7.60	7.97
poles	30.25	-89.98
aerial cable, metallic	20.61	-23.03
aerial cable, non metallic	26.14	-17.53
underground cable, metallic	25.00	-18.26
underground cable, non metallic	26.45	-14.58
buried cable, metallic	21.57	-8.39
buried cable, non metallic	25.91	-8.58
intrabuilding cable, metallic	18.18	-15.74
intrabuilding cable, non metallic	26.11	-10.52
conduit systems	56.19	-10.34

Support: The default values are the weighted average set of projected depreciation lives, and net salvage percentages, coming from 76 LEC study areas including all the BOCs, SNET, Cincinnati Bell, and numerous GTE and United companies. Weighting is based on total lines per operating company. The projected lives and salvage values are determined in a triennial review process involving each state PUC, the FCC, and the LEC to establish unique state-and-operating-company-specific depreciation schedules. See, FCC Public Notice D.A. #'s 95-1635, 93-970, 96-1175, 94-856, 95-1712. NID and SAI lives are calculated as the average life of metallic cable, since lives are not separately specified for those plant categories and they are classified as outside plant.

5.3. EXPENSE ASSIGNMENT

Definition: The fraction of certain categories of indirect expenses, including the loop component of general support, as well as network operations, other taxes, and variable overhead, that are assigned to loop UNEs (distribution, concentrator, feeder and NID), and thus to universal service, on a per-line basis, rather

than the default assignment based on the relative proportions of the direct costs associated with these UNEs.

Default Value

Expense Assignment	Percent to be assigned per line
General Support Leeps	
Furniture – Capital Costs	0 %
Furniture – Expenses	0 %
Office Equipment – Capital Costs	0 %
Office Equipment – Expenses	0 %
General Purpose Computer – Capital Costs	0 %
General Purpose Computer – Expenses	0 %
Motor Vehicles – Capital Costs	0 %
Motor Vehicles – Expenses	0 %
Buildings – Capital Costs	0 %
Buildings – Expenses	0 %
Garage Work Equipment – Capital Costs	0 %
Garage Work Equipment – Expenses	0 %
Other Work Equipment – Capital Costs	0 %
Other Work Equipment – Expenses	0 %
Network Operations	0 %
Other Taxes	0 %
Variable Overhead	

Support: the default assumption is that these costs are most appropriately assigned in proportion to the identified direct costs, not on a per-line basis.

5.4. STRUCTURE SHARING FRACTIONS

Definition: The fraction of investment in distribution and feeder poles and trenching that is assigned to LECs. The remainder is attributed to other utilities/carriers.

Default Values:

Structure Percent Assigned to Telephone Company						
	Distribution			Feeder		
Density Zone	Aerial	Buried	Underground	Aerial	Buried	Underground
0-5	.50	.33	1.00	.50	.40	.50
5-100	.33	.33	.50	.33	.40	.50
100-200	.25	.33	.50	.25	.40	.40
200-650	.25	.33	.50	.25	.40	.33
650-850	.25	.33	.40	.25	.40	.33
850-2,550	.25	.33	.33	.25	.40	.33
2,550-5,000	.25	.33	.33	.25	.40	.33
5,000-10,000	.25	.33	.33	.25	.40	.33
10,000+	.25	.33	.33	.25	.40	.33

Support: Industry experience and expertise of HAI and outside plant engineers; Montgomery County, MD Subdivision Regulations Policy Relating to Grants of Location for New Conduit Network for the Provision of Commercial Telecommunications Services; Monthly Financial Statements of the Southern California Joint Pole Committee; Conversations with representatives of local utility companies. See the structure sharing discussion in Appendix B.

5.5. OTHER EXPENSE INPUTS

5.5.1. Income Tax Rate

Definition: *The combined federal and state income tax rate on earnings paid by a telephone company.*

Default Value:

Income Tax Rate
39.25%

Support: Based on a nationwide average of composite federal and state tax rates.

5.5.2. Corporate Overhead Factor

Definition: Forward-looking corporate overhead costs, expressed as a fraction of the sum of all capital costs and operations expenses calculated by the model.

Default Value:

Overhead Factor
10.4%

Support: Based on data from AT&T's Form M. See, also earlier ex parte submission by AT&T dated March 18, 1997 and Appendix C.

5.5.3. Other Taxes Factor

Definition: Operating taxes (primarily gross receipts and property taxes) paid by a telephone company in addition to federal and state income taxes.

Default Value:

Other Taxes Factor
5%

Support: This is the average for all Tier I LECs, expressed as a percentage of total revenue. Revenue and tax data are taken from the 1996 ARMIS report 43-03. See, also Appendix B.

5.5.4. Billing/Bill Inquiry per Line per Month

Definition:

The cost of bill generation and billing inquiries for end users, expressed as an amount per line per month.

Default Value:

Billing / Bill Inquiry per line per month
$1.22

Support: Based on data found in the New England Incremental Cost Study, section for billing and bill inquiry where unit costs are developed. This study uses marginal costing techniques, rather than TSLRIC. Therefore, billing/bill inquiry-specific fixed costs were added to conform with TSLRIC principles.[50]

To compute this value from the NET study, the base monthly cost for residential access lines is divided by the base demand (lines) for both bill inquiry (p. 122) and bill production (p. 126). The resulting per-line values are added together to arrive at the total billing/bill inquiry cost per line per month.

5.5.5. Directory Listing per Line per Month

Definition: The monthly cost of creating and maintaining white pages listings on a per line, per month basis for Universal Service Fund purposes.

Default Value:

Directory Listing per line per month
$0.00

Support: Because the FCC and Joint Board have determined that white pages listings are not an element of supported Universal Service, this value is set to default to zero. HAI estimates that the cost of maintaining a white page listing per line is $0.15 per month.

5.5.6. Forward-Looking Network Operations Factor

Definition: The forward-looking factor applied to a specific category of expenses reported in ARMIS called Network Operations. The factor is expressed as the percentage of current ARMIS-reported Network Operations costs per line.

Default Value:

Forward Looking Network Operations Factor
50%

Support: ARMIS-based network operations expenses are -- by definition -- a function of telephone company embedded costs. As reported, these costs are artificially high because they reflect antiquated systems and practices that are more costly than the modern equipment and practices that the HAI Model assumes will be installed on a forward-looking basis. Furthermore, today's costs do not reflect much of the substantial savings opportunities posed by new technologies, such as new management network standards, intranets, and the like. See Appendix D for a more detailed discussion of the savings opportunities associated with network operations.

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[50] New England Telephone Company, *"1993 New Hampshire Incremental Cost Study"*, p. 122, 126.

5.5.7. Alternative Central Office Switching Expense Factor

Definition: The expense to investment ratio for digital switching equipment, used as an alternative to the ARMIS expense ratio, reflecting forward looking rather than embedded costs. Thus, this factor multiplies the calculated investment in digital switching in order to determine the monthly expense associated with digital switching. This factor is not intended to capture the cost of software upgrades to the switch, as all switching software is part of the capital value inputs to HM 5.0a.

Default Value:

Alternative Central Office Switching Expense Factor
2.69%

Support: New England Incremental Cost Study.[51]

5.5.8. Alternative Circuit Equipment Factor

Definition: The expense to investment ratio for all circuit equipment (as categorized by LECs in their ARMIS reports), used as an alternative to the ARMIS expense ratio to reflect forward looking rather than embedded costs.

Default Value:

Alternative Circuit Equipment Factor
0.0153

Support: New England Incremental Cost Study.[52]

5.5.9. End Office Non Line-Port Cost Fraction

Definition: The fraction of the total investment in digital switching that is assumed to be not related to the connection of lines to the switch.

Default Value:

End Office Non Line-Port Cost Fraction
70%

Support: This factor is a HAI estimate of the average over several different switching technologies.

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[51] New England Telephone Company, *"1993 New Hampshire Incremental Cost Study"*, p. 394

[52] New England Telephone Company, *"1993 New Hampshire Incremental Cost Study"*, p. 394

5.5.10. Monthly LNP Cost, per Line

Definition: The estimated cost of permanent Local Number Portability (LNP), expressed on a per-line, per-month basis, including the costs of implementing and maintaining the service. This is included in the USF calculations only, not the UNE rates, because it will be included in the definition of universal service once the service is implemented.

Default Value:

Per Line Monthly LNP Cost
$0.25

Support: This estimate is based on an ex parte submission by AT&T to the FCC in CC Docket No. 95-116, dated May 22, 1996.

5.5.11. Carrier-Carrier Customer Service, per Line, per Year

Definition: The yearly amount of customer operations expense associated with the provision of unbundled network elements by the LECs to carriers who purchase those elements.

Default Value:

Carrier-Carrier Customer Service per line
$1.69

Support: This calculation is based on data drawn from LEC ARMIS accounts 7150, 7170, 7190 and 7270 reported by all Tier I LECs in 1996. To calculate this charge, the amounts shown for each Tier 1 LEC in the referenced accounts are summed across the accounts and across all LECs, divided by the number of access lines reported by those LECs in order to express the result on a per-line basis, and multiplied by 70% to reflect forward-looking efficiencies in the provision of network elements. See, also Appendix C.

5.5.12. NID Expense, per Line, per Year

Definition: The estimated annual NID expense on a per line basis, based on an analysis of ARMIS data modified to reflect forward-looking costs. This is for the NID only, not the drop wire, which is included in the ARMIS cable and wire account.

Default Value:

NID Expense per line per year
$1.00

Support: The opinion of outside plant experts indicate a failure rate of less than 0.25 per 100 lines per month, or 3 percent per year. At a replacement cost of $29, this would yield an annual cost of $0.87. Therefore, the current default value is conservatively high.